

REMARKS

Claims 6, 9, and 10 are currently pending in the instant application.

Claim 8 has been cancelled and its subject matter has been incorporated into claim 6. In addition, claim 10 has merely been amended to conform to the amendment of claim 6. Accordingly, the amendments are supported at least by the previous claims, and no new matter has been added.

In addition, entry of the amendments after final rejection is appropriate and respectfully requested. Thus, claim 6 is identical to cancelled claim 8, and the remaining claims 9 and 10 are dependent from claim 6. Therefore, no new issues are being raised, the number of claims has been reduced, no new claims have been added, and it is believed that the amendments place the claims in condition for allowance, or at least in better condition for appeal. Accordingly, entry and consideration of the claim amendments after final are respectfully requested.

At the outset, Applicant acknowledges with appreciation the Examiner's withdrawal of the previous rejection of the claims over Leon. However, it is noted that the Examiner has not mentioned the previous rejection of claims 6 and 8-10 as being anticipated by U.S. Patent 6,773,873 of Seijo. This rejection was argued to be moot in the third paragraph of page 3 of the Amendment filed April 3, 2006, for the same reasons as the rejection over Leon. Therefore, Applicant assumes that the Examiner also intended to withdraw the previous rejection of Seijo, and that rejection will therefore not be discussed herein.

The Examiner has again rejected claims 6 and 8-10 under 35 U.S.C. § 102(b) as being anticipated by U.S. Published Patent Application US2003/0158059 A1 of Sakai et al. ("Sakai") for the same reasons set forth in the Office Action dated January 3, 2006. Although this rejection was not repeated in the current Office Action, the rejection was confirmed by the Examiner in a telephone interview of June 29, 2006 and the Examiner Interview Summary of July 6, 2006.

In addition to the comments in the previous Office Action, the Examiner argues at paragraph 2 of the current Office Action that only two ingredients are required by the instant claims, and only one ingredient is required for choosing. Therefore, he argues that one skilled in

the art of chemistry would not be required to pick and choose these ingredients, but would only be required to select an individual ingredient. The Examiner concludes that such selections are not extraordinary, and one skilled in the art would be able to determine Applicant's invention in light of the Sakai reference. Further, the Examiner contends that it is known in the art to use different corrosion inhibitors, since they function in roughly the same manner, i.e., preventing oxidation of copper.

This rejection is respectfully but strenuously traversed for the reasons set forth in response to the previous Office Action, which are incorporated herein by reference, and the additional reasons set forth in detail below.

As pointed out in response to the previous Office Action, mannitol is only one of a multitude of potential reducing agents listed in paragraph [0014] of Sakai as a possible ingredient for his detergent composition. Similarly, tetraalkylammonium hydroxide (a quaternary ammonium hydroxide) is only a small group of many organic base compounds listed in paragraphs [0021] and [0022] of the Sakai application as a pH adjustment agent for the detergent composition. Thus, contrary to the Examiner's argument, one skilled in the art would be required to choose among two large, separate lists of ingredients in order to arrive at the invention of previous claim 8, now independent claim 6.

The Examiner seems to acknowledge that the presently claimed invention is a selection invention, but argues that one of ordinary skill in the art would be able to determine Applicant's invention, in light of the Sakai reference. However, Sakai provides no guidance in the selection of a particular reducing agent and a particular organic base compound.

Moreover, Sakai provides no example using mannitol as a reducing agent and no example using a quaternary ammonium compound as a pH adjusting agent, much less an example using both of these ingredients. In fact, among the reducing agents listing in Table 2 (paragraph [0053] of Sakai), there is not a single sugar alcohol, much less mannitol, and all of the pH adjusting agents are amines, not quaternary ammonium hydroxides.

In contrast, as can be seen from Table 1 (Examples 4 and 5) of the present specification, a combination of mannitol with tetramethylammonium hydroxide provides a remarkable effect of a zero (0.0) etch rate of a copper membrane on the silicon wafer, and less than the combination of another sugar alcohol (xylytol) combined with tetramethylammonium hydroxide.

In sum, there is no basis provided in Sakai for selecting a washing liquid comprising mannitol and a quaternary ammonium hydroxide for washing a semiconductor substrate, after forming a copper wiring by chemical mechanical polishing. Moreover, the present application demonstrates a remarkable effect from the use of mannitol and a quaternary ammonium hydroxide as the washing liquid. Therefore, the rejection of the claims as anticipated by Sakai is unwarranted, and reconsideration and withdrawal of the rejection are respectfully requested.

The Examiner has further rejected claims 6 and 8-10 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 6,815,151 of Tanabe et al. ("Tanabe" also referred to by the Examiner as Kobayashi, Masakazu). The Examiner contends that Tanabe teaches a process for manufacturing semiconductor devices and liquid crystal display devices comprising forming a resist pattern on a conductive metallic film which may be made of copper, selectively etching the conductive metallic film, using a mask pattern to form fine circuits, and then removing unnecessary resist pattern layer, using a remover solution. Concerning the basic compound, the Examiner contends that Tanabe teaches tetramethylammonium hydroxide as a developer to form the resist pattern. Further, the Examiner contends that Tanabe teaches mannitol as an example of a saccharide, while acknowledging that D-sorbitol is preferred.

This rejection is respectfully but strenuously traversed for the reasons set forth in detail below.

The Examiner's rejection is not understood, since all the Examiner has done is to cite specific ingredients in isolation, without any indication of their combination. This rejection is clearly improper as using hindsight based upon the disclosure of the present application.

As seen from the portion of Tanabe at col. 4, lines 43-54, the specific examples of Tanabe use tetramethylammonium hydroxide as an ingredient of the developing solution for the mask pattern, not as a washing liquid, as presently claimed.

Moreover, mannitol is merely one of a multitude of possible ingredients listed at col. 3, lines 14-54 of Tanabe, as part of the rinsing solution for removing the remover solution from the lithography substrate. Tanabe provides no basis for selecting mannitol over any other corrosion inhibitor, and in fact does not even suggest any basis for selecting any saccharide as the corrosion inhibitor. There is no specific example in Tanabe of using mannitol, and as noted above, Tanabe even prefers D-sorbitol among the saccharides listed.

In sum, Tanabe does not teach a quaternary ammonium hydroxide as a component of a washing liquid for washing a semiconductor substrate after forming a copper wiring by chemical mechanical polishing. Further, Tanabe does not provide any basis for selecting mannitol as a possible corrosion inhibitor. In fact, Tanabe teaches away from using mannitol and does not recognize the remarkable effect of using mannitol, as shown in Tables 1 and 2 of the present application. Accordingly, the rejection of the claims as anticipated by Tanabe is improper, and reconsideration and withdrawal of the rejection are respectfully requested.

In view of the above Remarks, it is submitted that all of the claims in the present application patentably distinguish over the prior art of record. Reconsideration and withdrawal of the rejections and an early Notice of Allowance are respectfully solicited.

Respectfully submitted,
Masayuki Takashima

September 15, 2006
(Date)

By: 

WILLIAM W. SCHWARZE

Registration No. 25,918

AKIN GUMP STRAUSS HAUER & FELD LLP

One Commerce Square

2005 Market Street, Suite 2200

Philadelphia, PA 19103-7013

Telephone: 215-965-1200

Direct Dial: 215-965-1270

Facsimile: 215-965-1210

E-Mail: wschwarze@akingump.com